December 10, 2002

NOTICE OF DECISION

WATER POLLUTION CONTROL PERMIT
NUMBER NEV60050

Cortez Gold Mines
Toiyabe Mine

The Nevada Division of Environmental Protection has decided to issue renewal of Water Pollution Control Permit NEV60050 to Cortez Gold Mines. This permit authorizes the closure of approved mining facilities in Lander County. The Division has been provided with sufficient information, in accordance with Nevada Administrative Code (NAC) 445A.350 through NAC 445A.447, to assure the Division that the groundwater quality will not be degraded by this operation and that public safety and health will be protected.

The permit will become effective December 25, 2002. The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to Nevada Revised Statues (NRS) 445A.605 ad NRS 445A.407. All requests for appeals must be field by 5:00 PM, December 20, 2002, on Form 3, with the State Environmental Commission, 333 West Nye Lane, Capitol Complex, Carson City, Nevada 89706-0851. For more information, contact Karl McCrea directly at (775) 687-9407, toll free in Nevada at (800) 992-0900, extension 4670, or visit the Division website at http://ndep.nv.gov/bmrr/bmrr01.htm

A comment letter was received via U.S. mail on October 3, 2002 from Steve Foree, Supervising Habitat Biologist with the Nevada Division of Wildlife Elko office. The letter is attached to this Notice of Decision with Division responses.

NDEP Response to the Nevada Division of Wildlife comments
Letter received via U.S. mail on October 3, 2002
(NDEP Responses in **bold *italics***)

October 3, 2002

Dave Gaskin
Chief, Bureau of Mining Regulation and Reclamation
Division of Environmental Protection
333 West Nye Lane, Room 154
Carson City, NV 89706-0851

RE: Renewal of the Water Pollution Control Permit NEV0060050 for the Toiyabe Mine, Cortez Gold Company – NDEP

Dear Mr. Gaskin:

We appreciate the opportunity to review and provide comments on the subject document. At this time, the Nevada Division of Wildlife supports renewal of the Water Pollution Control Permit for the Toiyabe Mine. We have been in communication with Cortez Gold Mine regarding the draindown fluids from the heap leach pad. If monitoring can demonstrate the effluent water chemistry is of sufficient good quality the Division of Wildlife is interested in installing a wildlife drinker to allow wildlife access to the water. If you have any question concerning this input, please contact Rory Lamp of our staff in Elko.

Sincerely,

Steve Foree
Supervising Habitat Biologist
60 Youth Center Road
Elko, NV 89801
(775) 777-2368

RL/rl
Cc: Habitat Bureau
Gerald Smith, Field Office Manager, Battle Mountain Field Office, BLM
Battle Mountain Field Office, NDOW
File

DIVISION RESPONSE

The Division appreciates your comments and interest and will provide copies of the quarterly monitoring data for the heap draindown at your request.

A comment letter was received by e-mail, at the close of the comment period on October 24, 2002, from Christie Whiteside, Program Associate, Great Basin Mine Watch. The letter is attached to this Notice of Decision in its entirety with Division responses.

NDEP Response to Great Basin Mine Watch Comments
Letter received via e-mail on October 24, 2002
(NDEP Responses in **bold *italics)***

October 18, 2002

Karl McCrea
Nevada Division of Environmental Protection
Bureau of Mining Regulation and Reclamation
333 W. Nye Lane, Room 138
Carson City, NV 89706-0851

Dear Mr. McCrea,

Thank you for the opportunity to submit comments on Water Pollution Control Permit NEV0060050 for the subsurface injection of heap draindown for the Toiyabe Mine. Substantial environmental concerns exist for this proposal and we are concerned that both the process for issuing this permit, as well as the factual environmental analysis are inadequate.

(Comment 1) - Cortez has been allowed to dispose of heap draindown in this manner since May of 2002 under a temporary permit, which was issued without any public notification or review. While we understand that NRS 445A.485 allows for the issuance of temporary permits without public notice and review, it is doubtful that the intent was to allow a temporary permit for what would otherwise have been a major modification of the permit. The subsurface infiltration of heap draindown, as designed and permitted temporarily, required Cortez to build and install the necessary infrastructure before the final water pollution control permit was issued. This required substantial expense and time on the part of Cortez. It also required that Cortez work with the BLM to write and rewrite a draft and final environmental assessment. The public notification and review

should have been initiated as close to concurrently with the BLM process as possible but definitely before Cortez was allowed to undertake this project. The Division's decision to allow this to occur severely undermines the public disclosure and participation process. This is particularly distressing in a situation such as this, in which the process in question has the potential to adversely affect the environment and, public health and welfare.

DIVISION RESPONSE:

> ***The Division of Environmental Protection (Division) did not require, nor request, Cortez Gold Mines (Cortez) to construct this subsurface infiltration field. Cortez constructed this infiltration field following approval of their Bureau of Land Management (BLM) required closure Environmental Impact Statement (EIS) document, but prior to our review of the site and issuance of this draft Water Pollution Control Permit (WPCP). Cortez applied for a temporary discharge permit and proposed disposal of process fluid through the now existing infiltration field. The Division reviewed the proposal and, because our review indicated that waters of the State would not be degraded through a temporary discharge through this existing subsurface infiltration field, approved and permitted the temporary discharge. This Division has never stated to the operator that the now existing subsurface infiltration field will be allowed to be used permanently in post-closure, as proposed by Cortez, until the Water Pollution Control Permit has been finalized. Had our analysis of the proposed permanent closure of this facility indicated that the use of this infiltration field was unacceptable, the operator would not be allowed to use it. Under Nevada statutes and regulations, there is no requirement for parallel BLM/Division permitting and public comment periods. The BLM NEPA process, and the documents produced by this process, are separate from the Division's permitting process and procedures.***

(Comment 2) – The Division has based its decision to allow the subsurface infiltration of heap draindown, on its contention that it will not degrade waters of the state. That has not been demonstrated in any of the documents we have reviewed. The Division has identified arsenic as being the main constituent of concern with respect to heap draindown. Heap draindown chemistry indicates that mercury, nitrate, chromium, and sulfate are also present in consistently elevated levels in the heap draindown. The chemistry of heap draindown has changed very little in nine years, and it is probable that these constituents will remain elevated for many years into the future. The soil attenuation of arsenic is inadequate to make the conjecture that soil attenuation of arsenic will keep it from entering the aquifer in measurable quantities. Appendix H of the Toiyabe Heap Closure Plan- Arsenic Soil Attenuation Capacity Calculations and Analytical Data, clearly shows the arsenic attenuation capacity of the local soil to be quite low. Attenuation studies indicate that for the first pore volume, arsenic concentrations were reduced, but for subsequent pore volumes, arsenic concentrations rose. Little attenuation was demonstrated for the other constituents of concern present in heap draindown. The heaps are currently draining at approximately 2 gallons per minute.

According to a memo dated April 18, 2002, based on this draindown rate, and upon current draindown chemistry, each dose of draindown to the infiltration field will occur each 8.5 hours, and will consist of a 1,020 gallon dose. Each dose will contain 3.8 grams of arsenic, 0.0239 grams of mercury, 0.135 grams of chromium, 0.3 grams of nitrate, and 2 kilograms of sulfate. With the drinking water limit of 10 mg/L, and at the rate of flushing that is being proposed, this decision has the distinct (probable) capacity to contaminate nearly 15,000 gallons of water each day to the drinking water limit of nitrate. While some attenuation will certainly be observed early on in the soils, arsenic will also exceed drinking water limits in the groundwater in the near future.

DIVISION RESPONSE:

The decision to allow use of the subsurface infiltration field was based on the review of the documents "Toiyabe Mine Heap Leach Facility Final Plan for Permanent Closure, May 2001 revision" and "Toiyabe Mine Heap Fluids Disposal System, February 2002."

Regarding soil attenuation of arsenic, the commenter correctly points out that arsenic is the constituent of most significant concern and that the heap drainage appears chemically stable. Both of these conditions allow for environmental analysis with higher confidence. Arsenic, chromium, mercury, nitrate and TDS were elevated in the latest draindown chemistry. However, the chromium and sulfate exceedances are at or only slightly above the drinking water standard (drinking water standards are used only as a reference - heap draindown is not required to meet any chemical standard), and TDS appears to be on a downward trend. Furthermore, the MWMP data indicates that as draindown of residual solutions diminishes, the long-term chemistry from any infiltration through the heap will improve substantially with arsenic the only constituent remaining at or above the state of Nevada drinking water quality standard.

It appears that the commenter misunderstands the data presented in the Final Plan for Permanent Closure (FPPC) test and Appendix H. Two columns of alluvial soil material representing material from TSC-3 (5-39 feet) and TSC-4 (6-14 feet) from the Toiyabe substrate were subjected to rinsing by six pore volumes of spent process solution to measure attenuation characteristics of the subsurface materials.

Of the five boreholes drilled, these two samples were selected specifically for attenuation testing because they were the only ones without significant intervals of low permeability layers. Because attenuation increases with surface area available for adsorption of constituents this biasing of the columns toward more permeable materials would also bias the result toward a conservative estimate of attenuation capacity. Only the upper portion of TSC-4 was used in an attempt

to assess the attenuation capacity of the very near surface materials in which the infiltration system would be constructed.

In the TSC-3 column, arsenic concentrations are reduced from 1 mg/L in the feed solution to 0.009 mg/L in the first pore volume effluent. By the sixth pore volume of the effluent the attenuation capacity is reduced and effluent concentration is at the 0.05 mg/L limit. The results also indicate good attenuation for antimony and mercury, but chromium attenuation is limited to the first two pore volumes. As expected, sulfate and nitrate show limited attenuation. Cyanide attenuation appears negligible until the third pore volume but this may be a function of cyanide degradation during the testing program. The TSC-4 column simulated attenuation in shallow materials near the edge of the infiltration area and was intended to represent attenuation in the near-surface materials only. As with the TSC-3 column, the TSC-4 column results show good attenuation during the first two pore volumes for arsenic, chromium, antimony and mercury but decreases with later pore volume rinsing, indicating more limited attenuation capacity. Nitrate, sulfate and TDS are largely unaffected in this column test with effluent concentrations close to feed solution chemistry.

The attenuation capacity of ~9.2 mg/ft3 calculated from the attenuation test (FPPC, Appendix H, Page 6) is a conservative estimate and does not account for mineral equilibrium over time, but only the reactions observed in the column testing. Because the infiltration rate is low, arsenic attenuated is likely to become encapsulated within soil minerals formed over time and thus be less available for leaching. Consequently the true, field attenuation capacity is likely to be higher than observed in the testing program as re-dissolution of previously attenuated constituents is less likely and the formation of new attenuation surfaces proceeds.

Furthermore, the predicted draindown constituent concentrations are likely to be less than used in the attenuation evaluation (FPPC, pg. 26, Table 7, Appendix E). MWMP results (FPPC, Page 35, Appendix E) indicate that arsenic is the only constituent likely to be mobilized over the long-term at levels above State of Nevada Water Quality (SNWQ) standards. The modified results indicate that the long-term leaching rate will be in the 0.1 to 0.2 mg/L range for the spent ore on the Toiyabe heaps.

The 100-year flow rate used in the FPPC was extrapolated from the 5-year model rather than the 10-year model because the 10-year model indicated the flux through the pad will approach 0 by year 10. This was done to provide a very conservative estimate of the long-term flux. The curve fitting exercise indicated that the weighted flow rate for 100 years would be 0.3 gpm. As noted above, this number is considered to be very conservative because the 10-year model predicts near-zero flow by year 10. Nonetheless, if this flow rate is used,

the total flow from the heap over 100 years is equivalent to 40% of a single pore volume in the infiltration area. Using this flow rate and the conservative arsenic concentration of 1 mg/L, the total release of arsenic over 100 years would be approximately 131 pounds or 10.6% of the arsenic attenuation capacity of the soils beneath the infiltration site. If the highest arsenic values from the standard and modified MWMP tests are used the predicted 100-year release would be 67 lbs (5.43% of capacity) and 28 pounds (2.23% of capacity), respectively. Therefore, the available arsenic attenuation capacity (1234 pounds) of the soils beneath the infiltration site and other constituents is more than sufficient to attenuate the predicted mass/flux through the system over a period of much longer than 100 years (950 – 4500 years). Furthermore, since the long-term flow rates and total volume of solution anticipated in the infiltration field is much less than 0.3 pore volume even this estimate is conservative.

There is no direct conduit from the area of heap fluid discharge to groundwater. Attenuation of arsenic and the other constituents that exceed MCL's will occur as demonstrated by the attenuation study. The fluid distribution system was designed to spread the fluid over a large surface area (approximately 5 acres – piping buried at three feet below the surface) for the purpose of attaining a large attenuation area, to encourage maximum evapotranspiration and for minimizing solution percolation rates. For this purpose the infiltration field was designed based upon the following conservative assumptions.

The average design draindown rate would be 10 gpm (currently 1.7 gpm).
The solution application rate would not exceed the most conservative subsoil (free draining sand) saturated hydraulic conductivity of 8.38x10-3 cm/s (Q = 178 gallons per square foot per day). The infiltration field was then designed so that Q would not exceed a very conservative 2.88 gallons per square foot per day.

To compound the safety factor of the design, the calculated surface area for discharge (based on 10 gpm and Q = 2.88) was more than doubled from a calculated minimum of 5000 ft2 to 13,440 ft2.

All of these design elements will maximize attenuation, evapotranspiration, and reduce fluid percolation, minimizing risk to waters of the state.

Regarding heap draindown volumes, the most recent draindown rate, as of November 4, 2002, is 1.7 gallons per minute (GPM). Additionally, the long-term draindown rate was modeled without vegetation and evapotranspiration (ET) occurring from the heaps, ET basin or infiltration field for the first year with the following 10 years with vegetation. During a site visit by Division personnel in May 2002, it was noted that the entire site was well vegetated.

The memo of April 18, 2002, referenced above, contained a calculation error in regards to the amount of nitrate contained in each dose; the correct amount should be 0.301 kilograms/dose. The commenter incorrectly references the memo regarding chromium, the memo states 0.52 grams/dose; the 0.135 as referenced refers to the concentration in the draindown.

The division accepts modeling and laboratory testing as part of our decision making process. However, the Division understands that in many cases, these results represent only an informed, but incomplete, understanding of the various processes that may occur within the vadose zone. The cornerstone of the Mine Closure Branch program is post-closure monitoring. In the case of the Toiyabe Mine, the post-closure monitoring program will incorporate monitoring wells downgradient of both heaps and the subsurface infiltration field. These wells will provide empirical data as to the success of the operators mine closure procedures.

(Comment 3) - The soil permeability has been measured at 8.38 x 10^{-3} cm/sec (Toiyabe Mine Closure EA, p. 37) which is 23.75 ft/d. This is relatively high permeability. At this rate of application of draindown, seepage could reach the aquifer, which has been estimated to be approximately 280 ft bgs, in just a few days, although it is likely to be longer (see discussion below). This, coupled with the demonstrated poor soil attenuation of heap constituents, should have been enough to exclude subsurface infiltration from further consideration.

DIVISION RESPONSE:

Page 40 of the Toiyabe Mine Heap Leach Facility Final Plan for Permanent Closure (May 2001) indicates that down to a depth of 6 feet (which represents approximately 2% of the entire soil horizon above groundwater), sandy silts and sands were encountered with hydraulic conductivity of 8.38 x 10^{-3} cm/sec, based on an in-situ permeability test. This test was representative for that material only and cannot be used as an overall hydraulic conductivity to predict vertical flow through the alluvium. As discussed in 2, because this is the most conservative hydraulic conductivity for observed site lithology (sand and silty sand layers), this value was applied in the infiltration field design as a further factor of safety. Because flow rates are controlled by the lowest hydraulic conductivity in the flow path, the presence of clay layers found in the subsurface during drilling (FPPC, Appendix A, Soil Boring Logs) will substantially slow vertical migration of any infiltration.

Lithological data collected during drilling and installation of well WB-11 indicated zones of fine-grained material that included sandy and gravely clay, clayey sands, clayey gravels, silty clayey sands and clay in suspension

encountered throughout the entire horizon. This information suggests that no direct conduit to groundwater exists.

Page 33 of the FPPC reports that an average "hydraulic conductivity of 2.0 x 10^{-4} cm/sec for the alluvium". This was based on the saturated permeability (~ hydraulic conductivity) measured in a laboratory for the leach pad design (FPPC, Page 9, Appendix F). Even this hydraulic conductivity number is not representative of vertical flow in the alluvium because these tests were conducted on bulk samples, and cannot measure variations over the depth of the sample, let alone the entire depth of alluvium above groundwater.

The commenter fails to account for the area over which the solution is discharged, and for the stratification that occurs in cemented alluvial deposits. Because solution percolating downward through the subsurface will encounter zones of differing permeability, it will not flow straight down, but will also spread laterally. Further, the commenter fails to account for other influences such as evapotranspiration on the heap surfaces, evapotranspiration basin and over the infiltration field. The lack of these influences in the modeling efforts provides for an additional factor of conservatism in the long-term draindown model. In short the discharge is not at a point, the discharge is intermittent not constant, and there is no direct conduit from the point of discharge to groundwater.

(Comment 4) - The hydrologic investigation performed to date has been inadequate to fully describe and determine the local hydrology. The Environmental Assessment (EA) states that groundwater beneath the infiltration field is approximately 300 feet below ground surface. The EA also states that there is a perched water system in the area of the two heaps. No references or supporting data are given to back up the evidence that the more shallow groundwater is indeed perched. The presence of two springs, Upper Woods Spring,(directly downgradient of the pregnant pond to be used for the evapotranspiration basin), and Upper Wood Spring No. 2, (located to the north of the infiltration field), indicate that groundwater in this area is closer to the surface Additionally, the well log for WB-05, located downgradient, and approximately 200 feet to the north of the area in use for infiltration indicates that groundwater in this area is approximately 96 feet below ground surface. Well logs for WB-08, located immediately down gradient of Heap Leach pad No. 1 indicate that groundwater is 185 feet below the ground surface in this area. Well No. WB-10, located upgradient of the infiltration field indicates that groundwater is approximately 278 feet below ground surface in this area. Additionally, the Fact Sheet states that it is not clear if WB-05 and WB-08 are screened in the perched groundwater zone or the alluvial aquifer. The Fact Sheet states that fracture-controlled groundwater of variable depth exists as little as 40 feet below the bottom of the South Pit. Given the close proximity of these wells and the high variability of the depths at which they intersected the water table, it is very poor practice for the Division to allow this subsurface infiltration to occur without data from wells located within or just below the infiltration field.

DIVISION RESPONSE:

The report entitled "Site Characterization Report, Placer Dome U.S., Toiyabe Mine" dated May 1997 and the due-diligence drilling performed by Cortez in 1996, which identified two separate aquifers, both provide data to substantiate the presence of a perched aquifer in the area near the heaps. In addition, and as stated in the Fact Sheet (page 6) "Two production wells previously serviced the mine. The original well, located between the two waste rock dumps, taps groundwater in fractured bedrock and was used only on an intermittent basis, as it produced less than 10 GPM. Due to the lack of groundwater resources onsite, the main water supply well was located approximately 6.7 miles south of the mine on the flank of Grass Valley and produced up to 150 GPM." The Division assumes that condemnation/exploration drill holes were drilled (as is the norm) in the immediate area of the heaps before the heaps were constructed. Had a usable aquifer been discovered, it seems unlikely that an operator (Inland Gold and Silver Corporation) would expend significant funds in constructing a 6.7 mile pipeline.

The commenter is incorrect in stating the name of one of the springs; it is Upper Wood Springs, not Upper Woods Springs. The commenter is correct that Upper Wood Springs #1 is located north of the infiltration field, but fails to mention that it is approximately 1000 feet from the field and located in an entirely separate drainage.

As it is not entirely clear about the relationship of the two springs to localized ground water, either perched or otherwise, the Division is assuming a relationship between the springs and groundwater beneath the site, hence the requirement to monitor these springs.

The commenter is incorrect in stating the distance from monitoring well WB-05 as well as its location relative to the infiltration field. The distance is approximately 1000 feet not 200 feet as stated and is not downgradient of the infiltration field – it is located upgradient to the northeast.

In addition, comparing the average mean sea level (amsl) elevation of wells WB-05 and WB-10 to the depth to groundwater for each well indicates that the static water level is at approximately 6739 feet amsl and 6712 feet amsl, respectively, suggesting that both wells are in a deeper alluvial aquifer

The depth to groundwater in WB-08 is approximately 153 feet, as verified by recent monitoring, and not 185 feet as reported in the original well log.

The commenter is incorrect in stating that well WB-10 is located upgradient of the infiltration field. Well WB-10 is located adjacent to the infiltration field and

well within the 'reach' of any lateral spreading or movement of the heap draindown solution.

As stated, since it is unclear in which groundwater zone (perched or the alluvial system) WB-05 and WB-08 is screened, the Division has taken the position that the zone, perched or otherwise, will be protected.

The pits are located on the east side of the groundwater divide, i.e. – hydrologically separated (locally) from the heaps by a ridge, located at a much lower elevation and have not impounded water. Additionally, as stated on Page 6 of the Fact Sheet, "Drilling in the pit area to depths exceeding 1,000 ft. bgs intersected variable amounts of fracture-controlled groundwater at varying depths".

The wells are not located proximally close to each other; Well WB-08 is approximately 1200 feet upgradient of WB-05 and approximately 1800 feet upgradient of WB-10. The closest pit is located approximately 2800 feet upgradient and across the groundwater divide from WB-08. In addition, none of these wells are located within or just below the infiltration field.

Site topography is highly variable, and as one would expect, in such topography and cemented alluvial deposits, groundwater elevations are also variable.

In the case of the drainage in which the infiltration field is located, in addition to the already existing well (WB-10), the draft WPC Permit stipulated the installation of an additional downgradient monitoring well. This downgradient well (WB-11), installed November 15, 2002, will provide empirical information regarding the success of the infiltration field in the long term. Depth to groundwater in the new well is at 193 feet bgs and the existing background groundwater quality is similar to WB-10 in that the groundwater meets all drinking water quality MCL's.

(Comment 5) - Despite the lack of a detailed analysis of the rate that water will move to the groundwater, it appears that the Division has concluded that this contaminated water would not reach the groundwater water table. In fact, there is little basis for this conclusion and the only question that remains is when (not if) the seepage will reach groundwater.

DIVISION RESPONSE:

See Division responses to Comments 2 and 3 above.

(Comment 6) - We realize that the conductivity discussed in the previous paragraph may not apply throughout the entire vertical distance to the groundwater table. However, it likely does apply to the point that bedrock is encountered after which fracture flow will

control. If a wetting front forms, it will reach the bedrock in just days. Because the vadose zone will not likely become saturated immediately, the flow velocity will depend on the physical characteristics of the infiltration zone, and the contaminated water will likely reach bedrock over a time frame measured in many days to several months. Because the bulk of the bedrock would have a much lower conductivity, the water would pond on top of it. Quite likely, a saturated, perched zone would form on top of the bedrock and then it would flow into the fractures. Thus, the rate of flow to the groundwater could be slow, or it could be rapid.

However, neither NDEP nor Cortez has performed any significant groundwater flow modeling, nor have they shown any specific data to provide a level of confidence that the NDEP will protect the ground waters of the state. If you or they have, please provide the reference in response to these comments. The time frame that contaminated water will degrade the existing groundwater is less important than the fact that it will reach groundwater. The NDEP does not have the authority to protect groundwater for only a few weeks or even a few years; groundwater resources simply need to be protected without consideration of a time frame.

DIVISION RESPONSE:

The Division does not concur with the commenters statement "If a wetting front forms, it will reach bedrock in just days" for the following reasons:

- ***a) There are no known preferential pathways to bedrock;***
- ***b) The lithological log for well WB-10, and the recent well log for WB-11, indicated cemented alluvium; for all other wells, i.e. – WB-01, WB-02, WB-03, WB-04, WB-05, WB-06, WB-07 and WB-08, logs indicated alluvium. There is no mention of any fractures being encountered during drilling of any of these wells;***
- ***c) Bedrock was not encountered during drilling of WB-10 nor WB-11;***
- ***d) According to the exploration drill log for hole MTY061, drilled near WB-05 and located approximately 1200 feet downgradient of the heaps, the data infers that bedrock would be encountered at a depth of at least 550 feet below the infiltration field;***
- ***e) Lithological data collected during drilling and installation of well WB-11 indicated zones of fine-grained material that included sandy and gravely clay, clayey sands, clayey gravels, silty clayey sands and clay in suspension encountered throughout the entire horizon;***
- ***f) See Division Response to Comment 13.***

Because the application rate is orders of magnitude lower than the saturated hydraulic conductivity for the site, and that flow in unsaturated conditions is via migration through fine-grained materials, unsaturated flow through the cemented alluvium will dictate lateral migration of the infiltrating drainage thereby making it extremely unlikely that water will ever reach groundwater let alone bedrock.

(Comment 7) Because the resolution of the question of degradation depends on the rate of movement to the groundwater, NDEP should require Cortez to install vadose zone monitoring sites in the infiltration field to track the movement of the water to the groundwater.

DIVISION RESPONSE:

The Division believes that the two monitoring wells adjacent and downgradient of the infiltration field, WB-10 and WB-11, respectively, provide adequate empirical data as to the condition of the groundwater.

(Comment 8) – What evidence does the division have that the shallow aquifer beneath the heaps is perched? Has there ever been a formal groundwater reconaissance survey performed for this site in its entirety? As stated in the Fact Sheet, the hydrology beneath this site is highly variable. Hydrology data directly beneath the infiltration field is sparse. To date, only one well has been drilled in the vicinity, which is upgradient of the actual infiltration. Even if the groundwater is perched, the Division has no conclusive basis for concluding that it is perched.

DIVISION RESPONSE:

As stated in the Fact Sheet (page 6) "During the due diligence process in 1996, CGM drilled nine boreholes in the area of the heaps. Drilling of the wells helped to identify that there are perched aquifers and an alluvial aquifer beneath the heaps." It needs to be made clear that the Division has taken the very conservative approach of protecting what may well be a perched aquifer. Therefore, the question of perched zones is not an issue with this permit.

There are now two wells in the direct vicinity of the infiltration field. The Division is not stating that the groundwater beneath the infiltration field is perched.

See also DIVISION RESPONSE to Comments 4 and 7 above.

(Comment 9) – Also, the question of whether the aquifer is perched or not is somewhat irrelevant unless it is acceptable to degrade perched water. In this location, with precipitation ranging from 14 to 17 inches per year, perched aquifers are fed by precipitation. Their discharge point is to a spring on the surface. Or, the perched water

will seep through the aquitards at a discontinuity and reach the regional groundwater. We are also mystified why the Division even thinks that a perched system does not fall under the groundwater protection regulations, and how a perched system is excluded from protection. The Division needs to provide a rationale and a citation in the regulations that indicates that perched water is not protected by groundwater regulations. How large must a perched system be in order to be considered protected groundwater? What data are required to show a system is perched and not valuable?

DIVISION RESPONSE:

It is not absolutely certain that these two springs are a result of perched water in the area of the heaps (or infiltration field). The Division is assuming this however, hence the requirement for the operator to monitor these springs.

It appears to the Division that there are perched aquitards that do not produce 'usable' groundwater at this site. Additionally, the installation of micro-purge pumping systems in the monitoring wells was also driven by the fact that the wells are poor producers, i.e. – low pumping volume and slow recharge rate.

The Division does not have any set criteria to determine whether or not a perched system (groundwater) is considered valuable and worth protecting. Groundwater is defined in the Mining Regulations (NAC 445A.350 to 445A.447, inclusive), by NAC 445A.361 - "Ground water" defined. - "Ground water" means all subsurface water comprising the zone of saturation, including perched zones of saturation, which could produce 'usable' water." The determination of usable water is essentially based on the proposed use of the specific aquifer. As an example, as stated in Division Response 4-1, the operator pumped water from the Grass Valley area approximately 6.7 miles away. In this situation, the site aquifer could not produce usable water.

In needs to be made clear however that the Division has taken the very conservative approach of protecting what may well be' unusable' aquifers. Again, the Division is basically protecting 'all' groundwater zones identified with this project.

See also Division Response to Comments 4 and 8.

(Comment 10) - The monitoring protocol is very limited in scope. The draft permit calls for monitoring in only four wells, plus only one to be drilled in the location of the infiltration field within one year. It should be increased to include vadose zone monitoring as described above.

DIVISION RESPONSE:

The NDEP feels that each of the four wells included in the monitoring protocol serve a specific and valid purpose. Well WB-04 is located directly downgradient of the North leach pad; WB-05 is located directly downgradient of the former ponds and former process area and WB-08 is located directly downgradient at the southwestern toe of the South leach pad. WB-10 and WB-11 will provide data relative to the success of the infiltration field.

The final permit will also include quarterly Profile I monitoring of the newly installed well, WB-11 and existing well WB-07, located upgradient of the south leach pad.

See also DIVISION RESPONSE to comment 7

(Comment 11) - Water from monitoring wells WB-04,WB-05, WB-08, and WB-10 will only be analyzed for antimony, arsenic, chromium, iron, mercury, nitrate, pH, sulfate, and TDS, according to the draft permit. This reduced Profile 1 is insufficient. Water quality testing should include chloride, as it is a good indicator of conserved contaminants. Additionally, the wells should be analyzed for WAD cyanide, which has recently been detected in wells WB-04 and WB-10 . Why has the Division discontinued monitoring for WAD cyanide in these wells, in light of the fact that it has been detected? Additionally, testing should be conducted for selenium, manganese and chromium, as well as sodium. Cobalt should also be determined, as since cobalt cyanide complexes are very soluble and stable, and although we recognize that no standard exists for this contaminant, it nevertheless would be considered a serious water contaminant if these waters were ever to be used for drinking water, stock water or irrigation purposes. Well WB-4 has had exceedances for cadmium, arsenic, chromium, iron, lead, manganese, selenium and has had detectable levels of WAD Cyanide. Well number WB-05 has exceeded MCL's for antimony, aluminum, arsenic chromium, iron, manganese nickel, TDS, and has had detectable levels of WAD cyanide. Well number WB-08 has exceeded standards for arsenic barium, beryllium, cadmium, manganese, lead, and has detectable levels of WAD Cyanide. Why is the Division allowing such a reduced sampling profile for these wells? The aquifer beneath this site has obviously been degraded and discontinuing monitoring and allowing for reduced sampling is not good environmental practice and does not ensure that degradation of groundwater will not occur (or in some of the above cases, continue).

DIVISION RESPONSE:

The NDEP monitoring requirements are based, for the most part, on conservative constituents contained in the draindown and, as pointed out in your comments, chloride and sodium will be added to the monitoring requirements.

WAD cyanide is not being required in the monitoring wells analytical suite for two reasons: 1) the concentration of WAD cyanide in the draindown solution is

less than 0.2 mg/L as required for closure per NAC445A.430, and 2) as stated in the Fact Sheet, page 7, Paragraph 2, Sentence 4, "Following these anomalous results, CGM installed dedicated micro-purge pump systems and since inception (September 2001), the WAD cyanide levels have been consistently below analytical detection limit." Recent sampling, October 22, 2002, indicates that water quality at wells WB-04, WB-05, WB-08 and WB-10 meet or exceed all state of Nevada water quality standards per NAC445A.144.

Chromium is already included in the modified analytical package. Additionally, the final permit will be modified to include a full NDEP profile I analysis on an annual basis. Selenium in the draindown is currently less than one-half the MCL, and, as mentioned earlier, the WAD cyanide level is less than 0.2 mg/L, and even if cobalt is present in the draindown, there is relatively no cyanide available for complexing, therefore, NDEP is not requiring the analysis of selenium, cobalt, or WAD cyanide.

Based on review of NDEP's records, it appears that the commenter is incorrect in stating that the above-mentioned wells have shown exceedances of various metals. Water quality data indicates there have been no exceedances of cadmium, arsenic, chromium, lead and selenium, with an occasional iron and manganese exceedance in well WB-04; Well WB-05 has shown no exceedances of antimony, aluminum, arsenic, chromium, iron, manganese, nickel or TDS, and Well WB-08 also has not indicated exceedances of arsenic, barium, beryllium, cadmium, manganese, or lead as stated by the commenter. The commenter is correct in stating that detectable levels of WAD cyanide were found previously, however, this was determined to be a result of cross-contamination during sampling and, as stated in Division response above, samples collected in October of this year indicate the water quality to be of very good quality. Additionally, it should be noted that, per NAC445A.144, the MCL for antimony is 0.146 mg/L and has not been exceeded in any of wells or the draindown.

The Division is allowing this reduced sampling profile because the water chemistry results of the heap draindown indicate that these constituents are present in the draindown and historic water quality data for these wells indicate, with an occasional exceedance of iron and manganese, they have never exceeded the state of Nevada water quality standards and would be excellent indicators in the event degradation occurs.

As stated in response above, based on the recent sampling of October 22, 2002, data indicates that water quality at wells WB-04, WB-05, WB-08 and WB-10 meets or exceeds all state of Nevada water quality standards per NAC445A.144. Based on this data, the Division does not agree with your statement that water quality beneath the entire site has been degraded, only that degradation may

have occurred beneath the eastern portion of the south pad as evidenced by the water quality of well WB-07.

Review of quarterly reports prior to Cortez taking control of the site identified solutions collecting in the leak detection system of the south heap leach pad as well as both the preg and barren ponds. Winter ice had actually cut the primary liners. The volume of solution in the heap leak detection system was small and did not indicate a serious problem. However, there is the possibility that a leak may have been present on the eastern side of the South pad, and that during rinsing/evaporation of solution to the heap, sufficient hydraulic head was present to force solution through a compromised area of liner, resulting in elevated levels of arsenic reporting in WB-07. Due to the lack of background water quality data upgradient of the site, it is not clear if these elevated concentrations are natural background levels or the result of escaping process solution. Because of these elevated levels and lack of data, the Permittee will be required to investigate. The ponds have since been repaired and the leach pad leak detection system was eliminated during heap closure. As there is no longer a hydraulic head on the pad liners, it is assumed that the vast majority of solution will exit the heaps through the existing heap draindown systems (path of least resistance). Therefore, even if the heap had a leak, the Division would not expect arsenic levels to increase. However, to verify this assumption, monitoring of well WB-07 will be required. In a Division required change to the final permit, the Division is including a Schedule of Compliance item for the operator to provide a draft investigation plan for elevated arsenic levels reported in well WB-07 within three months of permit issuance. In addition, the operator will be required to monitor well WB-07 on a quarterly basis for the Profile I analytical package.

(Comment 12) - There should be more than one monitoring well located in the infiltration field. The infiltration field is a large area, and monitoring only one well is not sufficient.

DIVISION RESPONSE:

See also DIVISION RESPONSE to Comment 7 above and 13 below.

(Comment 13) - The fact that the Division allowed this infiltration to begin without first requiring Cortez to drill monitoring wells in highly questionable. Cortez went to great expense and effort to install all of the necessary infrastructure for heap draindown infiltration. The Fact Sheet states that until Cortez drills the one monitoring well required for the infiltration field, that well number WB-10 will be used to monitor groundwater quality for the infiltration field. This well is upgradient of the infiltration, which renders it of very limited use as an indicator of water quality beneath the infiltration field. Any degradation caused by the infiltration will go virtually undetected. Cortez has had ample time to drill more wells, and the Division should have required them to do so.

DIVISION RESPONSE:

As stated previously in both Division Response to Comments 4-5 and 8-3, the commenter is incorrect in stating that well WB-10 is located upgradient of the infiltration field. Well WB-10 is located adjacent to the infiltration field and well within the 'reach' of any lateral spreading or movement of the heap draindown solution.

As stated in the Draft permit Schedule of Compliance, Part I.B.1, the operator will be required to install a monitor well located centrally to and downgradient of the infiltration field. This well was installed November 14, 2002 and is located approximately 200 feet directly downgradient of the furthest lateral extent of the distribution 'arms' and encountered groundwater at approximately 195 feet below ground surface.

In addition, since the infiltration field is located in a drainage and groundwater flows follow local topography, NDEP feels that only one well, located approximately 200 – 500 feet down-gradient, centrally located near the bottom of the drainage is sufficient to monitor groundwater. The infiltration field is designed such that the leach lines are located along the hillsides above the central axis of the drainage.

The total volume of solution discharged under the temporary permit until termination on November 2, 2002 was 779,184 gallons. The field was designed with an adsorption area, the area of infiltration actually in contact with soil, of 13,440 sq. ft. keeping in mind that the entire infiltration field has an area of 209,088 sq. ft. Using a conservative hydraulic conductivity of 8.38 x 10^{-3} cm/sec., this total volume equates to a hydraulic head of 7.75 cubic feet of water per square foot of ground contact. Relating this to a dosing volume of 1020 gallons occurring each 8.5 hours, this would result in 0.076 gallons per sq. ft. of ground contact and a hydraulic head of 0.01 cubic feet of water per square foot of soil (approximately 1/8 inch) approximately 3 times a day.

See also DIVISION RESPONSE to Comments 2,3 and 7 above.

(Comment 14) – The fact sheet appears to argue that there is a high natural background arsenic level. The data does not support this conclusion. The data for monitoring well WB-07 does not show an "average concentration 0.43 mg/L; rather, it has increased from 0.11 on 6/14/99 to 0.43 mg/l on 8/21/00 with a peak of 0.66 mg/l on 6/21/00. This data clearly shows an upward trend that is likely due to some leakage from the south heap leach pad. Also, by stating that the well is upgradient from the heap, the Division is clearly setting the stage for arguing that it is "background". Merely being uphill topographically does not prove that the groundwater follows the same gradient. To prove that it is truly upgradient, the Division should identify which two wells are used to

establish the gradient. The two wells must be in the same aquifer level. Clearly, it is possible for flow to be in different directions at different levels. Otherwise, the Division, as part of the compliance schedule for this permit renewal, should require that Cortez identify the source of the arsenic and plan for remediation.

DIVISION RESPONSE:

> ***The Division agrees with GBMW that there is not enough data to clearly establish a high natural background arsenic level in groundwater at this site. The fact sheet will be amended to reflect this.***
>
> ***The available data for arsenic in WB-07, from 12-12-00 to 10-7-01 (5 data points) indicate an overall decreasing trend, i.e. – 0.51 mg/L to 0.26 mg/L, respectively. The recent sampling of November 13, 2002 indicated a concentration of 0.147 mg/L arsenic, which confirms the decreasing trend.***
>
> ***To determine groundwater gradient, WB-07 was triangulated with wells WB-08, WB-06, and WB-05 (See Appendix A, Figure Section A-A in the Plan for Permanent Closure, May 2001). Additionally, the Broadbent & Associates Inc. Site Characterization Report of May 1997 utilized monitoring wells WB-01, 02, 03, 04, 05, 07, 08, 09, MW-2, 4 and 5 resulting in a calculated regional groundwater gradient of 0.086 ft/ft, with a regional flow direction of west - southwest.***

(Comment 15) - No criteria have been established in the regulations for determining the usefulness of groundwater. It seems to use that all groundwater in the state should be considered useful, and should be treated as such, and no degradation should be allowed. Cortez has failed to prove that this activity will not result in degradation of waters of the state. Poor attenuation results, variable depth to groundwater, which at its deepest beneath the site is approximately 300 feet below ground surface, poor quality of heap draindown, which has changed very little in nine years, and a relatively high soil permeability combine to make this an environmentally risky undertaking which has the potential to seriously degrade waters of the state. We request the following:

1. The NDEP should immediately revoke permission for Cortez to infiltrate its heap draindown and require other alternatives for management of the contaminated heap drainage should required that do not threaten groundwater A variety of treatment options are available that do not involve release of contaminated fluids to the environment.

DIVISION RESPONSE:

> ***The Division believes that there are enough safeguards in place (directly adjacent and directly downgradient monitoring wells) to identify any degradation of waters of the State. In addition, the operator has constructed a***

very conservatively designed infiltration field designed to actually preclude attenuated process solution from even reaching groundwater.

See also Division Response to Comment 2 above.

2. A revised closure plan should required that includes a much more extensive -cap on the heaps to minimize the flow of contaminated water from the heaps.

DIVISION RESPONSE:

Until there is evidence of problems with this site closure, the present closure plan is adequate. The modeling efforts performed for the closure of the heaps indicated that an 18 inch thick cover was sufficient to minimize the infiltration of meteoric water and indicated the long-term combined draindown rate would be less than 0.3 GPM after 10 years. During closure of the heaps, approximately 24 inches of topsoil was placed on the top of the heap and 18 inches on the sides. In addition, the modeling did not account for the construction of an attenuation cell, revegetation of the heaps or infiltration field or evapotranspiration that would occur during the first year.

3. Additional monitoring wells should be installed to determine the extent of groundwater contamination that has already occurred.

DIVISION RESPONSE:

There is no evidence that this mine has contaminated a usable aquifer. Whether or not additional monitoring wells, or additional closure activities, are required at this site will depend on the results of the investigation of arsenic in WB-07.

It should be made clear however that there is no evidence of a process solution plume in any groundwater at the site. WB-07, the well in question, is upgradient of several nearby wells and these downgradient wells have shown no evidence of process solution escaping into the environment.

4. This mine has already contaminated groundwater around the mine. The NDEP needs to require Cortez to provide a plan for remediation of those contaminated areas.

DIVISION RESPONSE:

See Division Response to Comment 11 and Item 3 above.

5. This permit application is sufficiently inadequate that a completely new permit application should be required, followed by a public comment period.

DIVISION RESPONSE:

> ***The Division does not support your statement. Cortez Gold Mines submitted a Final Permanent Closure Plan for the Toiyabe Mine that contained the required information to allow for a permit renewal of a site in closure.***

6. We request that a policy be established that will preclude a flawed permitting process that has clearly occurred in this case. The Toiyabe Mine has not produced gold for over 7 years. There was no emergency and no need to have a temporary permit issued, and the fact that it was issued suggests that the Division is not compliant with its own regulations.

DIVISION RESPONSE:

> ***The Division does not agree with your comment. The commenter is correct in that there was no emergency, however an emergency is not a requirement for a temporary discharge permit. The need for a temporary discharge of process fluid lies with the operator. The Division has the responsibility to ensure that waters of the State are not degraded as a result of the action. In this case, the Division determined that waters of the State would not be degraded by this temporary action and the installation of WB-11 has, at this time, demonstrated that.***

Thank you for allowing us to submit comments. We will be looking forward to your response.

Sincerely,

Christie Whiteside